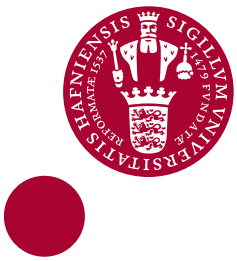


The effect of long- and short term exposure to laser light at 1070 nm on growth of Saccharomyces cerevisiae

Aabo, Thomas Ask; Perch-Nielsen, Ivan R.; Dam, J. Seidelin; Palima, D.Z.; Siegumfeldt, Henrik; Glückstad, Jesper; Arneborg, Nils

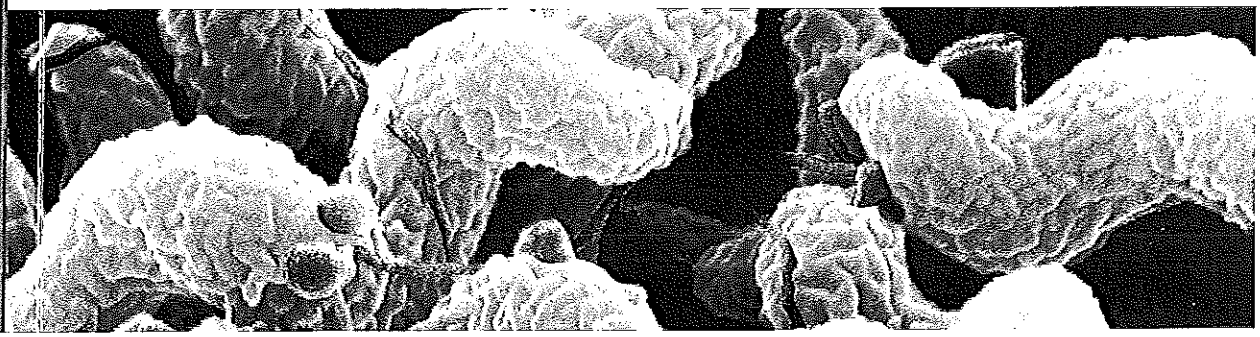
Published in:
22nd International ICFMH Symposium Food Micro 2010

Publication date:
2010

Document version
Early version, also known as pre-print

22nd International ICFMH Symposium Food Micro 2010

Copenhagen 30th August - 3rd September



Final Programme & Abstract Book

FOOD MICRO 2010
Microbial Behaviour in the Food Chain

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PED2.39 The effect of long- and short term exposure to laser light at 1070 nm on growth of *Saccharomyces cerevisiae*

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As a preliminary step, before using a biophotonics workstation for studying microbial interactions within food systems, we have investigated the effect of a 1070 nm continuous wave Ytterbium fiber laser on exponentially growing *Saccharomyces cerevisiae* yeast cells over a span of 4 hours. The cells were immobilized onto Concanavalin A covered microscope slides and the growth was measured using the area increase of the cells in 2D. Using a continuous dual beam plane wave with a uniform spatial intensity distribution, we found that a continuous radiant flux through a single cell as low as 0.5 mW in 1.5 hours significantly changed the growth and division rate of *S. cerevisiae*. With the dual beam setup used we were able to successfully manipulate single *S. cerevisiae* cells in 3 dimensions with a minimum flux thorough the cell of 3.5 mW. In the regime investigated from 0.7 mW to 2.6 mW we found no threshold for the photo damage, but rather a continuous response to the increased accumulated dose.

PED2.40 Growth of *Salmonella* in minced meat after freezing

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Adaptive response to environmental changes is fundamental for bacterial survival and differs between exponential and stationary phase cells, with stationary phase cells being generally more resistant. Bacterial survival under food environmental stress is typically performed with stationary phase cells, however, during slaughter; bacteria in the feces may appear in mixed growth phases. One of the most commonly used preservative techniques for meat is freezing, which arrests bacterial growth and reduces the number of bacteria. The potential for survival and growth of *Salmonella* frozen in exponential phase is unknown.

Aims: One aim of this study was to investigate the survival of exponential and stationary phase cells of *Salmonella* in minced meat after freezing and thawing. Secondly, the aim was to investigate the lag-phase and the growth rate of exponential and stationary phase *Salmonella cultured* at 25°C in the juice drip from the defrosted meat.

Methods: Minced meat was inoculated with exponential and stationary phase cells of *Salmonella* and frozen at -20°C. The meat was defrosted at 5°C after 0, 2, 8, 20 and 34 days and bacterial counts were performed for measuring of survival. The meat juice was collected and incubated at 25°C, and bacterial numbers were established after 0, 2, 4, 6, 8, 10 and 27 hours. Estimation of the lag phases during growth in meat juice was performed using the Baranyi and Roberts model from DMFit.

Results: Significant difference of survival between the exponential and stationary cells was found after freezing. No reduction of stationary cells was observed after 20 days whereas exponential cells were reduced up to 2 $\log_{10}$ units. A difference in lag phase for the exponential and stationary cells was identified. during culturing in the meat juice but depended on the length of the freezing period prior to culturing, After freezing for 2 and 5 days at -20°C the average lag phase was estimated to 2.5 and 5.3 hours for the exponential and stationary cells, respectively. When the meat had been stored for 20 days at -20°C the differences in lag phases were less pronounced having lag phases of 5.1 and 6.4 hours for the exponential and stationary cells, respectively.

PED2.41 Safety in

Maria Da
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PED2.42 Challenge

Maria I. Gil
(1) CEBAS-

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